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THE APPEARANCE OF THE HEAVENS AT THE
POLE AND AT THE EQUATOR.

IN the first class of one of our Grammar Schools, during a recitation in mathematical geography, one of the pupils started the question as to how the sun and stars must appear to a man standing exactly on the north pole. A discussion immediately ensued: some were for having the sun rise at a certain point in the horizon, and gradually ascend in a straight line, higher and higher, day by day, for three months, until he reached his greatest altitude, and then sink in the same straight line, disappearing at the end of the long half year of Arctic day, at the same place where he made his appearance; because, said the young disputant, the sun rises in the east and sets in the west, to us, for the reason that we have a diurnal motion with the earth from west to east. The man standing at the north pole, however, has no west to east motion, he only goes round and round with the axis, and, therefore, being a fixture himself, the sun must be a fixture to him, as far as the daily motion is concerned, and it must rise twenty-three and a half degrees above the horizon, and sink in the same manner, because this last motion would naturally be caused by the inclination of the earth's axis and its revolution round the sun. This, he thought,

was a good theory, and he was willing to defend it. But some had their doubts; one suggested that every way was south from the north pole, and in which part of the horizon was the sun to come up? This puzzled him. Another thought that his turning round on the axis would somehow give a motion to the sun in an opposite direction, but what that motion was he could not exactly see. It is worth something to be amongst ardent young minds, just struggling with a new idea—to see them striving with its condition and adapting their theories to it on all sides. It may be that one of them, catching the solution, elbows his way to the front, to deliver, with unconscious eloquence, the statement of his success. Arnold of Rugby was wont to look straight into the eyes of such a boy, and say, “I am proud to be your teacher.”

But what *are* the “conditions of visibility?” They differ, we might say, according to the different latitudes of the stations whence the heavens are observed. If we could establish an observatory at the north pole of our globe, the point where the north star is perpetually fixed in the zenith that is placed vertically above our heads, nothing would be more curious to an astronomer of the temperate zones, and, above all, to one who had observed the heavens only from equatorial regions, for the observations here are absolutely the reverse of what they are at the equator.

At the north pole, as every body knows, the year is made up of only one day and one night; the day, lasting from the vernal to the autumnal equinox, has the sun, during that whole interval, constantly above the horizon, and therefore there is not a single opportunity to observe the heavenly constellations. To balance this, from the month of September to the month of March, the sun, fallen below the horizon, sheds over it not a single ray. What a magnificent night of six months for an astronomer able to endure the cold! What a sublime spectacle, that of all the stars of the northern hemisphere, always to be seen in the heavens, and unrolling themselves like a vast panorama! The north star above his head would describe a circle so small that it would appear immovable. For him the Great Bear, the finest constellation of our northern heavens, would tread a portion of “his eternal circle” towards the south, and the stars which here are nearly over our heads, would be half way to the horizon. The remarkable fact, however,

would be that which exists only at the poles, that they never appear to rise or set, neither to come to the meridian, every horary circle being a meridian for them, and in consequence no star is ever higher or lower at one time than another. There would be nothing to prevent his view from reaching as far as the equator, but he could not see beyond that; he would see the stars of the equatorial regions, just skimming above the horizon and forming a circle all the way round it. The thing to remark, therefore, is, that though only one-half of the celestial sphere is visible, it is perpetually visible, and without that daily intermittence in other regions, caused by the movement of the earth on its axis. As with the stars, so is it with the sun in these regions. When he first appears above the horizon, he is seen just grazing its edge, and describing a circle all the way round. The next day he is a little higher, and the next higher, and so on winding his way spirally around and up the heavens, until at the summer solstice he has reached his highest point, and begins to descend, also in a spiral, but contrary to that described in the ascent. We may here remark that this continual presence of the sun above the horizon caused confusion in the minds of both Capt. Parry's officers and men. Many of the former, who were furnished with pocket chronometers, could not always bear in mind what part of the twenty-four hours they had arrived at; and the men declared they never knew night from day during the whole of the "Sledge Expedition." Parry himself was aware that this difficulty might be experienced, and had therefore provided for it. He procured, before starting on this voyage, some chronometers made by the celebrated Frodsham. They were constructed in such a manner that the hour hand made but one revolution in the day; the hours being marked round the dial plate from one to twenty-four. This was an absolute necessity, for had he reached the north pole, where the change in the sun's altitude during the twenty-four hours is not perceptible, he would have had no certain means of knowing midnight from midday — three o'clock in the afternoon from three o'clock in the morning. A mistake of twelve hours of time would have carried him, when he intended to return, on a meridian opposite to, or one hundred and eighty degrees from the right one; putting his sledges towards Kamtschatka, when he desired to return to England. With his

watch, however, started on Greenwich time, he knew where he was. The sun would be over the meridian of Greenwich only at XXIV. o'clock, and to start for that point in the horizon over which the sun stood *then*, would be starting for *home*.

If, now, we pass from the north pole to the equator, and establish ourselves on the high plateaus of Quito, just under the line, the heavens will present an aspect entirely new. Here, the day, very nearly twelve hours long, is followed by a night of equal length. The heat is tempered by the elevation, and the observer can therefore consecrate twelve hours out of the twenty-four to the celestial marvels. The stars are no longer visible all the time, but to compensate for this, in the course of the year, all the stars which stud both hemispheres pass in their turn under his eye. Each night the view extends from pole to pole, but it embraces only half the sphere. The stars here, therefore, rise and set and accomplish only half their course above the horizon. The astronomer, in looking towards the north, will see the polar star level with the horizon; but as that star is situated pretty nearly a degree and a half from the pole, it will describe a circle of equal radius round that point, consequently rising a degree and a half above the horizon, to sink an equal depth below. Thus we see that the star which appears to us the immovable centre of the diurnal revolution, can there be in view only half the time. As the stars approach the equator, the circles which they describe become larger and larger, and their movements more and more rapid. The Great Bear, which describes a circle of less than thirty degrees' radius round the pole, is, notwithstanding its nearness to the northern horizon, one of the most majestic constellations in view in either hemisphere. A French gentleman, who was born in the Mauritius, but who has been a resident of Rio Janeiro now for many years, recounts that during certain evenings, he has stopped to contemplate it from his window, as it recalled his years in Europe; at the same time that he saw the Great Bear low down in the north, he could turn and see in the midst of the southern sky that luminous cross which lights up the Antarctic night, and which brought back to his mind sweetly and forcibly the time of his infancy.

The position of the south pole is not indicated in the heavens by any star serving to point it out, and though a person standing at

Quito might have an extent of view reaching to that point, he would see nothing remarkable below the tropics, except, perhaps, two whitish isolated spots, twenty-five or thirty degrees above the pole, shining with a doubtful light, something like that of the milky way, and which are called Magellan's clouds.

WHY WE SEE OBJECTS IN AN ERECT POSITION.

If the image of an object, formed on the retina of the eye, is inverted, the question is asked, Why do we see objects in an erect position? First, we will consider what the erect position is: whether it is a *relative* or an *abstract* term, as regards space. That is, whether we view or compare objects with some object *relatively*, or to their different *positions* in space. If we view objects in different positions in reference to space, without any comparison with other objects, or to each other, when shall we say they are inverted? For example: the earth revolves in space, completing a revolution once in twenty-four hours. Hence, as regards space, it occupies an opposite position, (independent of its journey around the sun,) once in twelve hours. If this is so, when shall we say it is in an inverted position as regards space? We instantly see by this, that there cannot, in reference to *space*, be any inversion of objects. We will now consider the subject *relatively*. Suppose we take a globe, the different parts of its surface not presenting any dissimilarity of appearance; how we shall place it on a table, or on the ground, so as to have it appear inverted? We see at once it would be impossible. The reason of this is, we do not assign to it any particular *relative position* as its proper one. If we consider an object, which we are in the habit of assigning a particular relative position, when we see it in the opposite position we say it is inverted. For an example of this last class of objects, suppose we consider a building. Now, when we see a building in a certain position, we say it is erect. What is that position? It is when we see the foundation of the building nearest to the earth. Hence it is a relative position, and has nothing to do with its posi-

tion in regard to space. If we now examine the image of the building on the retina of an eye, we shall find that the *relative* position of the building and the earth is the same ; while the position in space is an opposite one. The question may now be asked, why do we not see objects in an opposite position as regards space, from what they really are ? But may not this be *true*, and yet the objects appear in an erect position, and we be insensible of this change of position as regards space ? To prove this, we will make use of the following illustration :

While considering this, we will keep in mind some of the negative properties of space. Space, considered abstractly, has no particular direction, it is without limit ; with it there is no such thing as applying the terms north, south, east, and west, up or down. These are mere relative terms, applying to bodies in space.

Suppose a miniature representation of the earth, with all the objects upon it in their natural positions, be placed on one side of a double convex lens, at such a distance that the lens will throw an image of it upon a screen. If we now observe this image, we shall find that it occupies a different position, as regards space, from the object ; yet the relative positions of the objects on the globe are the same. Hence the objects could not be said to be inverted, as inversion is a mere relative term. If we should say that the image was inverted, we should also have to admit that the earth is inverted part of the time. For, suppose the representation of the earth be turned half way round, the position of the image would be the same as that of the object before moved. We see objects on the earth in the same manner through the double convex lens, by the retina of the eye. Hence, as the earth completes a revolution once in twenty-four hours, every twelve hours we see objects in an exactly opposite direction, or position, as regards space. But it may be said, that when the earth revolves, we are carried with it, and hence the position of the eye, as regards space, would be changed, and thus we should see the objects in the same position. But if, in the illustration, at the same time we turn the globe we turn the lens also, the position of the image will nevertheless be changed. Or if we examine the image on the retina of the eye, we shall find the relative position of the image and the earth is the same. Hence its position in space is different. But although

the position is different, as regards space, we are unable to detect this difference in reference to objects upon the earth. We can see this difference, however, by the change of position which the heavenly bodies undergo. But since we are unable to detect this difference of position in regard to space, of earthly objects, we may see objects in an opposite position as regards space, and yet be unconscious of it. Since the relative positions of objects and the earth are the same as seen on the retina of the eye, and as we are unconscious of the change of position in regard to space, we must necessarily see them in their true relative positions, or in an erect position.

J. J. S.

“KEYS FOR THE USE OF TEACHERS ONLY.”

THIS is, indeed, a satire upon our learned profession as well as a shrewd advertisement of book-publishers. What a rich investment it would be for the Old Cambridge book-sellers to advertise 'Translations of Thucydides for Professors only! Would there not soon be an unusually large number of “ponies” stabled in the students' book-cases? The advertisement of the book-publisher who begs leave to announce to the public that he has issued a key for the use of teachers only, is an appeal to the ignorance and indolence of school-keepers, and because it lends the sanction of teachers to the use of keys and refuses their use to the pupils, — presents to the latter a two-fold inducement to purchase these “modern devices for making education easy.”

It is not proposed to show — what is nearly self-evident, — that pupils are injured in mind and morals by the use of keys; but we would show that teachers who depend upon keys in the school-room, degrade both their profession and their pupils.

The writer, not long ago, visited a town whose schools are regarded excellent. In a large grammar school, the principal, while conducting a recitation in Simple Interest, made a very generous use of Greenleaf's Key. The comparison of Greenleaf's operations with those of the pupils resulted satisfactorily, — with one exception. A little fellow whose native genius had not been entirely

eradicated, added to the interest at six per cent. one third of it, instead of "dividing by six and multiplying by eight." The learned teacher did only what every pupil of his class could have easily done, and what many of them probably had already done. Were this the only instance of such imbecility, we could afford to smile at it and let time or teacher's institutes provide a remedy. But genuine teachers owe to the dignity as well as to the usefulness of their profession a stern protest against the common practice of depending upon keys, which — while they may unlock the doors of the mind, like turnkeys do so only to imprison thieves and robbers.

It is an axiom, that the teacher should know the principles of the science or of the art, which he professes to teach; that he should know such facts as are necessary to illustrate or deduce the principles of the science; should be familiar with the best methods of presenting the principles of the art, and have the requisite skill to give the best examples in the best manner. In the light of this axiom, how does a teacher look, who, while in the school-room, depends upon keys? Does he not seem absurdly ignorant and totally incapable of instructing? It may be urged in his favor that he cultivates accuracy in his pupils. But such accuracy is often unreal: and, when real, is that of a machine which stamps a coin with beauty, yet mangles the hand that would remove it. With no mental vitality, no breadth of view or depth of insight on the part of the teacher, the education of the pupil must be superficial, narrow and deadening.

A comprehensive and accurate knowledge of the subject which one is teaching, is a power which no teacher can afford to be without. With it, — he has a proper confidence in himself, discovers the actual acquirements of his pupils, supplies their deficiencies, corrects their mistakes, receives that respect and exerts that influence which usually attend solid learning; without it, — no dependence upon keys, though their use be accompanied by all the good-breeding of Chesterfield or all the good-nature of Pickwick, can save him from being dubbed an ignoramus. Let him, unaided, beat or pick the lock of his pupils' mind, until their understanding is opened and enlightened and thought comes forth, he — though brutal and cunning — wields a power which must be respected as well as felt.

Not only is knowledge a power, but it is generally an incentive to higher attainment, to reflection and to original investigation. The true teacher, scorning to depend upon mean helps, is not satisfied to remain within the narrow confines of text-books, removes all artificial barriers, and comes forth into the world of knowledge, — intent upon a broad and correct view of things. Incompleteness and imperfection perceived rouse him to a strong endeavor to complete and perfect. Reflection and investigation are sure to be followed by some discovery — small it may be, yet important to the discoverer. A common error in the application or in the enunciation of a principle may be perceived and corrected; a method may be simplified, or one more philosophic may be discovered. Whatever discovery the teacher believes himself to have made, is an incentive to greater effort. He begins to look deeper; his mental grasp is stronger. Whims and fancies are banished away; veteran prejudices are stricken from the subject, which he now examines with all the simplicity of Descartes. Enlightened by the experience and wisdom of others, his original researches result — if not in the discovery of great truths and in the perfect comprehension of his subject, — yet, at least, in discovering what is valuable, and in a clear understanding of the extent and the bounds of his knowledge.

Let the teacher, thus prepared, be compared with the school-keeper who slavishly depends upon others. The one believes that he himself can teach his pupils, and they, in turn, confide in him; he is enthusiastic, and they glow with the love of study. Self-dependent, he teaches his pupils genuine independence, — throwing them on their own resources, fostering individuality, and yet endeavoring, by the varied means at hand, to develop harmoniously all the faculties of the mind. The other cannot trust himself, and his pupils do not trust him; he is mechanical, and they become spiritless; a slave to help, he teaches them to be dependents, — weakening and belittling them mentally, and fitting them to become mere tools and minions. Let it be confessed that the one sometime rides his hobbies to death; yet they are so spirited, and he rides them so skilfully, that all are glad to mount with him, and, though weary before the mettle of their steed is run out, rejoice that real progress is made. The other rides no hobbies: the long

ears of his stolen beast are *prima facie* evidence of a backward tendency, and of a stubborn determination to travel but one way. To get ahead of the beast is to feel the whip of the master ; to get behind, is to feel the heels of the beast ; to get on, is to be thrown off ; but to walk beside the beast is to be in safety. The true teacher deserves and usually receives the respect both of his pupils and of society. The false teacher generally excites that contempt which is always the desert of mere pretension. If, through the ignorance of others, or through his own skilful tactics, he escapes just censure, he yet must scorn himself, and must entail upon the majority of his pupils the ancient estates of the Sham and the Shallow family. Some, indeed, fortunately escape the bad effects of his superficialness, and invite the world to laugh or cry over the story of their pedagogic king, whose brazen crown covered an empty head, and whose golden keys unlocked such mysteries of mathematics and of language as could not be beaten into the mind with the birchen rod of empire. Master Dickens in his teens may sleep over his lessons, and Miss Bronte may groan in secret over her wrongs ; but even before the stupid or the unwise teacher has taken his last look at the school-room, there comes a fearful judgment day.

Long enough has the teacher been the butt of the world. History and romance have united to associate pedantry and brutality with his calling ; and, now, not a few teachers are preparing to crown the degradation of the noblest profession with indolence and ignorance.

E. P.

HINTS.

THE last number of *The Teacher* contained an article entitled "Etymology of a few Arithmetical Terms," which attracted my attention and seemed to demand a brief examination. The author of the article mentioned says, "The term money is derived from *moneo*, I admonish, teach, tell. Every coin or piece of money, and every bill used instead of coin, has something upon it to tell or admonish one of its value, and is, therefore, itself called money." Although such a view is favored by some etymologists, it appears

forced and fanciful, and will hardly bear investigation. In order to warrant the explanation of the origin of the word money from *moneo* directly, as given by the writer, it would be necessary to show that what has been called money, did from the first "have something upon it to tell or admonish one of its value," and that, I think, cannot be made out satisfactorily. Other authorities, with more reason, derive the word from *moneta*. *Moneta* was the name of a temple of Juno, on the Capitoline Hill, in Rome. In this temple, or in a building adjoining, the Romans coined their money, and so *moneta*, which properly meant a mint, by an easy and natural transition came to mean money; hence through the French *monnaie* comes our word money. Several explanations of the origin of the dollar-mark are suggested by the writer of the article under review, one of which, that it is a modification of the figure 8, it may be interesting to notice more fully. The old Spanish dollar was equivalent to *eight reals*, and in the written, as well as in the spoken language, used to be called "a piece of 8." This accounts for one part of this symbol. Again the best of the Spanish dollars had on the reverse two pillars, which, represented by two straight lines drawn through the 8, form with that figure the dollar-mark. Thus we have an explanation, at once simple and rational, showing that the sign \$ is "not merely an arbitrary token, but a *significant representative*," derived from the coin itself. This character was first employed early in the sixteenth century, so that the assumption so generally received, that it stands for U. S., the U being written on the S, may be dismissed as entirely destitute of foundation. The earliest use of this sign in the United States was probably in 1784, in Jefferson's Memorial proposing the dollar as the American money-unit. Jefferson's Works, Vol. I., page 164. It should be remembered by those who contend that the dollar-mark arose from the letters U. S., that instances are said to occur as early as 1796, in which the character S appears with a single line drawn through it. Now, since the adoption of the sign \$, with us, could not have preceded the establishment of American coinage, it will be seen that the recollection of the origin of the two straight lines — supposing them to have come from the letter U — was very soon forgotten. In the article referred to, it is stated that "there are strong reasons for supposing it to be a modification of

the Roman abbreviation IS.,— usually written HS.,— of the Latin word *sestertices*, meaning two *asses* and a half, the two I's standing for the number two, and the S for the word *semis* that is *semi as*, or halve an *as*, a brass coin nearly equal in value to a dollar and a half of our money. The *sestertices* was a silver coin worth a little more than three dollars and a half. "The *as* was not a brass, but a copper coin. Smith, Dictionary of Antiquities, says, "The Romans had no other coinage except copper or bronze, till B. C. 269, when silver was first coined." The value of the *as* varied at different periods, but I am not aware that it was ever more than two cents of our money. In the time of Cicero, it was worth about a cent and a half. The *sestertices* was not worth three dollars and a half, but about three cents and nine mills.

W. C. C.

IS IT PROPER TO DIVIDE CONSEQUENT BY ANTECEDENT TO OBTAIN THE RATIO OF THE LATTER TO THE FORMER?

BY W. D. HENKLE, LEBANON, OHIO.

THIS question has been answered in the affirmative by Davies, in his *Logic of Mathematics* and in his *Mathematical Dictionary*. He says that he has adopted this method "only after the most careful consideration of the arguments existing in favor of each."

His first argument is, that "This use of the term *ratio* is perfectly consonant with its employment in ordinary language," as when it is "said that the population of the country is increasing in a rapid ratio."

His idea of what is meant by this expression is manifestly incorrect. The United States' censuses do not give populations that form a progression in which the ratio is continually increasing, as he explains, "in a rapid ratio." The ratio of the annual increase to the population at the beginning of each year is slightly variable, but it is neither continually increasing nor continually decreasing. The expression means that the annual excess of births over deaths is rapidly increasing. The word *ratio* is not used at all in its

mathematical sense, unless we admit the old use of the term for *common difference*. Indeed, I think that in ordinary language, we hear "at a rapid rate" rather than "in a rapid ratio." Even if we admit Davies's explanation, we lose nothing, for by the ratio of the populations at any two epochs we mean the ratio of the population at the latter epoch to that at the former. So, too, when we say "that the units of our common system of numbers increase in a ten fold ratio," we mean that the ratio of any denomination to the one next inferior is always ten.

Again, that "In comparing numbers, the mind necessarily fixes upon 1 as a standard," proves nothing, for in conceiving of the relation of 6 to 1, we fix upon 1 as the standard, and 1 is the consequent of the ratio 6:1.

His next argument is drawn from the Rule of Three. "In order to find the fourth term, we have only to multiply the third by the ratio of the first to the second." "This simple rule for finding the fourth term, cannot be given, unless we define ratio to be the quotient of the second term divided by the first."

Was Dr. Davies so short-sighted that he did not see that the word *divide* might occupy the place of "multiply" in his "simple rule"? Cannot the fourth term of $6:2::9:x$ be found just as easily by *dividing* 9 by 3, the true ratio of 6 to 2, as by *multiplying* 9 by $\frac{1}{3}$, or Davies's ratio of 6 to 2?

"A concrete quantity can only be expressed numerically by the quotient obtained by dividing such quantity by its unit of measure, whatever that unit may be.

In the expression 6 dollars, 6 in abbreviated language is the ratio of 6 dollars to 1 dollar, and not of 1 dollar to 6 dollars, as Davies would have it. To be consistent, he would, in finding the relation or ratio of a crib of corn to a bushel measure, have to divide the measure by the crib.

"The adoption of this definition insures uniformity," for "all writers concur in regarding the ratio of a geometrical progression as the quotient of the second term by the first."

This use of the word *ratio* is legitimate, for by it is meant the ratio of any term of the series to the preceding term. The definition of the ratio of a geometrical progression as the ratio of any term to the preceding one, is given by Briot, Bourdon, Hind, Do-

charty, and Dodd. Peacock, Darley, and Byrne agree in saying that the ratio of a geometrical series is the *inverse* ratio of any two consecutive terms. Hence we see that Davies is wrong in charging authors that divide antecedent by consequent to express ratio with departing from this method in speaking of the ratio of a geometric series, and "without any explanation of a change in the definition." They do not depart from their definition, and the seven authors above referred to have brought out expressly the fact that the word *ratio* is used in no new sense.

Davies closes his arguments with, "The considerations of analogy, convenience and uniformity, taken together, leave no room for the adoption of a contrary definition." I accept this assertion for his definition of ratio is "*contrary*" and has nothing to recommend it except its *contrariness*. The attempt to give currency to an interpretation of ratio directly the opposite of the prevailing and time-honored one, on such flimsy arguments, is unjustifiable.

Some may be disposed to consider it a very small matter whichever way may be adopted in the abbreviation of a ratio. This is a mistake, as will appear in the following reasons for adhering to the old method.

First. It is philosophical. The only proper answer to the question, "What is the ratio of 6 to 2?" is, 6 is 3 times 2, and not 2 is $\frac{1}{3}$ of 6 as Davies would have it. The direct answer to the question "What relation did Sir Wm. Herschel bear to Sir John Herschel?" is, "Sir Wm. Herschel was the *father* of Sir John Herschel," and not "Sir John Herschel was the *son* of Sir Wm. Herschel." (Let it not be understood that I intend to convey by the form of this question that both of the persons are dead.) These illustrations show the order of the thought in the idea of ratio or relation, and that the new method is an inversion of it. This fact alone settles the question.

Second. This method is used in nearly all works upon pure and applied mathematics, and, therefore, should not be changed except for strong reasons.

Third. A change would necessitate an alteration in many prevailing expressions. The ratio of the circumference to the diameter would no longer be 3.1416; the differential coefficient would no longer be the ratio of the increment of the function to that of

the variable ; the sine would no longer be the ratio of the perpendicular to the hypotenuse ; the specific gravity of a substance would no longer be the ratio of its weight to that of an equal bulk of water ; the velocity would no longer be the ratio of the space to the time ; the probability of an event would no longer be the ratio of the favorable cases to the whole number of possible cases ; the ratio of the sun's influence upon the tides to that of the moon would no longer be one-half (.448) ; the ratio of the number of vibrations in the octave to the number in the key-note would no longer be 2 ; etc., etc.

Fourth. This method is in harmony with : as a sign of division, this sign being an abbreviation of \div or at least equivalent to it.

So natural is the correct method of expressing ratio that frequently good is present with those who would do evil. Even the great apostles of the false method have occasionally acted righteously. Lacroix in his "*Géométrie*" calls 3.1415926 the ratio of the circumference to the diameter. Davies says, *Pract. Math.*, p. 234, 1846, "The specific gravity of a body is the relation which the weight of a given magnitude of that body bears to the weight of an equal magnitude of a body of another kind." Davies's ratio applied to this definition would make the specific gravity of gold one-nineteenth.

NOTE. Most writers, including those who adopt the false ratio, define a geometric series as one in which the terms increase or decrease by a *constant multiplier*. Sherwin, in his general discussion of such series, uses *a* and *q* ; Chase, *a* and *m*, the former considering the series under the idea of a common *quotient* and the other under that of a common *multiplier*. In order to preserve the *r* in general discussions and have a short word, the common multiplier might be called the *rate*. Already has the term *ratio* as applied to equidifferent series been nearly supplanted by *common difference*. Although the French consider *rapport* and *raison* as conveying the same idea, they do not in practice speak of the *rapport* of a progression but of the *raison*.

"*Le rapport de chaque terme au précédent renomme raison.*" — Briot.

"Ce nombre de fois est ce qu'on appelle la *raison* de la progression." — Bezout.

"Ce *rapport constant*, qui existe entre un terme et celui qui le précède immédiatement, se nomme la *RAISON* de la progression." — Bourdon.

I have not observed any departure from the use of *raison* for the *rate* of an equimultiple series in French works.

THE best bow should sometimes be unstrung.

THE TRUANT.

MY teacher was a merry man,
And people called him witty;
He skilfully could "logic chop,"
Could preach or write a ditty.
My mother sent me off to school, —
Her rules were few but rigid, —
To learn of heat and polar snows,
Of temperate zones and frigid.

My task was light but ne'er performed, —
The time I idly wasted, —
My teacher soon his patience lost,
And soundly I was "basted."
I longed to leave the school-room's din,
And be with truants playing;
I thought that learning two times three,
Was harder far than haying.

The morning come, my class was called, —
The truth I now am telling, —
But I had packed my books and left,
Which pleased me more than spelling.
The teacher urged my quick return,
But loudly I protested;
My sisters joined their plea with his, —
These were alike detested.

I sought the camp and battle field
Renowned in ancient story;
I dreamed of wearing cap and plume,
And fighting all for glory.
'T was thus I lived full fifty years,
All learning proudly scorning;
I now am wretched, poor, despised, —
From me let youth take warning.

THAT education is incomplete which develops only one side of our nature. We cannot unduly exercise one faculty, without neglecting others; thus left to themselves, they soon become weakened by disuse.

USE THE MIND.

PRESIDENT FELTON, on a recent occasion, combated the notion that young people kill themselves by hard study. I wish to say emphatically, that all these stories are monstrous fabrications; that no child, girl, boy, man or woman, ever died or even injured themselves by hard study; and that all complaints made against schools, of injuring health of students by hard study, are utterly calumnious and false; and that among the most healthful exercises, the exercises that most promote vigor, strength — physical vigor, physical strength — is the exercise of the human brain, which is itself a physical organ, only it must not be exercised alone. But the pale and puny student, who flatters his self-conceit that he is suffering dyspepsia, and all the ills that come with it, because he is so intellectual, may not lay that flattering unction to his soul any longer; it is because he is a fool; it is because he is a fanatic; it is because he has not exercised his brain, and has neglected the other parts of his system also. With a sound system of physical exercise, and healthy modes of living, that same pale and self-fancying intellectual being would accomplish twice, four times the intellectual work that has brought him to death's door — and he prides himself in being in that very pleasant position.

It has been proved by statistics, that among the longer livers, as a general rule are the most intellectual. Prof. Pierce, of our University, examined the subject, and he found, somewhat to the surprise of a portion of his community [I won't say what portion] that taking classes in average, those that are the first to die are those who are the dumbest and stupidest, and most irregular during their college life; while as a general rule, [of course there are exceptions, but exceptions prove the rule in this as in other things,] the good scholars — those who exercise their brains constantly, thoroughly, faithfully, and have performed all their duties conscientiously — are the longest lived. I think these facts really worth being impressed upon the young. — *Exchange*.

He is a generous man who gives silently.

OBJECT TEACHING.

BY CHAS. DICKENS.

It is but a stone's throw from the High Court of Chancery—High, as we say also of venison or pheasant, when it gets in very bad odor—to the London Mechanics' Institute in Southampton Buildings. After a ramble among lawyers in their wigs and gowns, and a good choke in the thick atmosphere of chancery itself, we stepped in at once, one day not long ago, among a multitude of children in pinafores and jackets. There they were, one or two hundred strong, taking their time from a teacher, clapping their hands and singing "Winter is coming," and a great many more songs. They suggested much better ideas of harmony than the argument of our learned brother, whom we had left speaking on the question, whether money bequeathed to be distributed in equal shares to John and Mary Wilson and James Brown—John and Mary being man and wife—was to be divided into two parts or into three.

The children, when we went among them, were just passing from one class into another, and met in the great lecture room to sing together while they were about it. Some filed in, and some filed out; some were on the floor, some in the gallery; all seemed to be happy enough, except one urchin at the extreme corner of a gallery. He displayed an open copy book before him to the public gaze, by way of penance for transgressions in the writing lesson, but he looked by no means hopelessly dejected.

There are three hundred and fifty children in attendance on this school, which is conducted by five teachers. The children here, we were informed, are classed in the first instance according to their ages in three divisions, the first taking in those under eight years old; the second, those between eight and eleven; the third, children older than eleven. These form, in fact, three ages of youth. It is found most convenient to teach children classed upon this principle, and to keep the elder and the younger boys from mutual action on each other, because it would be impossible to provide for such a school so many teachers as could exercise very minute supervision. In each of these three divisions, the children are subdivided for the purpose of instruction into two classes—the quick and the slow—

which receive lessons suited to their respective capacities. It is obvious that, without punishment, five teachers could not preserve discipline among three hundred and fifty boys; and therefore, though it is but seldom used, a cane is kept on the establishment.

The children having clapped and sung together, sang their way out of the great room, in file, while others began streaming in. We were invited to an Object Lesson, and marched off (not venturing to sing our way into a class room), where we took our seat among the pupils, whose age varied between eight years and eleven. The teacher was before us. We were all attention. "Hands down." We did it. "Hands on knees." Beautifully simultaneous. Very good. The lesson began.

"I have something in my pocket," said our teacher, "which I am always glad to have there." We were old enough and worldly enough to know what he meant; but boys aspire to fill their pockets with so many things that, according to their minds, the something in the teacher's pocket might be string, apple, knife, brass button, top, hardbake, stick of firewood for boat, crumbs, squirt, gunpowder, marbles, slate pencil, pea-shooter, brad-awl, or perhaps small cannon. They attempted no rash guess, therefore, at that stage of the problem. "Boys also," our teacher continued, "like to have it, though when it gets into a boy's pocket, I believe that is is often said to burn a hole there." Instantly twenty outstretched hands indicated an idea demanding utterance in twenty heads. "If you please sir, I know what it is." "What is it?" "A piece of coal."

You draw your reasoning, my boy, from a part only of the information given to you, founding your view of things on the last words that sounded in your ears. We laughed at you, cheerfully; but when we see the same thing done in the world daily by your elders, we do not always find it laughing matter.

"This little thing in my pocket," the teacher continued, "has not much power by itself, but when many of the same kind come together, they can do great deeds. A number of them have assembled lately to build handsome monuments to a great man, whose name you all ought to know, who made the penny loaf bigger than it used to be—do you know what great man that was?" Minds were out, answers were ready, but they ran pretty

exclusively in favor of Prince Albert and the Duke of Wellington. "I am sure," says the teacher, "you must have heard who made all the loaves larger without altering the price, think again — who was it?" A confident voice hazarded the suggestion that it was "Guy Fawkes," and half-a-dozen voices cried "Guy Fawkes." There are always some to follow the absurdest lead, if it be taken confidently, in the great as in the little world.

"Guy Fawkes! nonsense, do you mean him to be carried about in your heads all through November and December?" More inquiry at length elicited, after a little uncertain hovering about Louis Napoleon, the decisive opinion that the man who made bread was Sir Robert Peel. "If you please, sir," said an argumentative little fellow, "*he* did not make the penny loaf bigger." "Why not?" "He did not make the loaf: he made the baker make it." The difficulty thus started having been properly gone into and further statement of the riddle having been given, it was at length fairly guessed that the teacher's object upon which he meant to talk with us that day was a Penny.

We ascertained that it was round, that it was hard, that it was brown, that it was heavy — by which we meant, as some of us explained, that it was heavier than the same quantity of water — that it was stamped on both sides and so forth; also that it was made of copper. Pence being next regarded purely in the light of coppers, the name of the metal, "Copper," was written at the top of a black board, and a line was drawn, along which we were to place a regiment of qualities. We began easily by asserting copper to be hard; and showed our penetration by discovering that, since a penny would not do for framing as a spy-glass, it must be opaque. Spell opaque? O dear, yes! twenty hands were out; but we were not all so wise as we imagined. No matter; there are folks of bigger size elsewhere who undertake what they are not able to do. O-p-a-k-e ought to be right; but, like not a few of which we could argue that they must be right, it happened to be wrong, so what was the use of talking. We heard a little boy in the corner whispering the truth, afraid as yet to utter it too boldly. It was not the only truth that has appeared first in a whisper. Yet as truth is great and shall prevail, it was but fit that we all finally determined upon o-p-a-q-u-e; and so we did; and we

all uttered those letters from all corners of the room with the more perfect confidence as they grew, by each repetition, more familiar to our minds.

A young student in a pinafore, eight years old and short for his age, square and solid, who had been sitting on the front row, nearly opposite the teacher, was upon his legs. He had advanced one or two steps on the floor holding out his hand; he had thought of another quality, and waited to catch Mr. Speaker's eye. But our eyes wandered among the outstretched hands, and other lips cried, "It is malleable;" so malleable was written on the board. It was not the word that still lurked in the mind of Master Square, who in a solid mood kept his position in advance, ready to put forth his suggestion at the earliest opportunity. What malleable meant, was the question over which we were now called upon to hammer, but we soon beat the answer out among ourselves; and then we spelt the word, and malleability into the bargain. Master Square uplifted his hand the moment we had finished; but there rose other hands again, and the young philosopher, biding his time in sturdy silence, listened through the discussion raised as to whether or not copper might be called odorous. This debate over, Square was again ready—but an eager little fellow cried that copper is tenacious, upon which there was a new quality submitted to our notice, which we must discuss, explain, and of which the name had to be spelt. But Master Square's idea had not yet been forestalled, and he, like copper, ranked tenacity among his qualities. At length he caught Mr. Chairman's eye, and said with a small voice, "Please, sir, I know a quality." "And what is that?" the teacher asked. Little Square replied, as he resumed his seat, "It's INORGANIC."

Here was a bombshell of a word thrown among us by this little fellow, but we did not flinch. Inorganic of course meant "got no organs," and we all knew what an organ was, and what a function was, and what were the grand marks of distinction between living and dead matter, and between animal and vegetable life. So we went on, with a little information about mining, and display of copper ore; a talk about pyrites, and such matters. Three quarters of an hour had slipped away.

THE LITTLE GERMAN GIRL'S PRAYER.

WHILE spending a few months in the family of a German clergyman, we were greatly amused one morning in listening to the account he gave of a prayer of his little daughter, a child about two and a half years old. We remember, as though it were but yesterday, the bright eye and happy face of the dear creature, as she came into the room each morning, while we were at table, and greeted us all, in her sweet and musical voice, with a pleasant "*Haben Sie gut geschlafen, mein Herr.*" We had boiled eggs for breakfast nearly every day, and the little girl was very fond of them. She did not sit at table with the family, but at a side table, of diminutive size, prepared expressly for her, with dishes, etc., to correspond. It was their custom, until instructed in a "better way," to put the eggs on one end into a little cup and remove a small part of the shell from the other, and eat them without pepper, salt, and butter, or "any such thing." The little girl had learned to prepare the eggs in this way. She was usually very talkative, but generally, at such times, "communed with herself," and no one at table noticed, for some time, what she was doing. Attention was called to her, however, by her stillness, and we observed a strange expression of countenance. The fact was, she had a poor egg.

She woke up very early the next morning, and insisted upon her mother's hearing her say her prayer. The mother did not wish to rise at such an hour, and requested the little girl to go to sleep again. She could not succeed, however, and beset her father to hear her prayer. He told her she could say it alone, as she knew it very well, or she could say a new prayer if she would like to. There was silence in her little "crib" for a minute or two, and then she began, speaking each word very slowly. "O Lord, I thank thee for bread — and butter — and cheese — and eggs. I like eggs ; but thou knowest I got a poor one yesterday. Amen."

SIR ISAAC NEWTON said, — "If I have any superiority over other men, it is due to nothing but industry and patient thought."

As is the fountain, so is the stream.

For the Massachusetts Teacher.

HAVING been somewhat interested in an article in the April number of *The Teacher*, entitled "How do the French express Ratio?" I took the trouble to examine the mathematical works in my possession, to see how far *theory and practice* correspond.

In proportion, or rather ratio and proportion, authors differ in *theory*, but in *practice*, solve their questions by substantially the same rules.

Robinson, Davies, Smith, Young, Hutton, Jackson, Beecher, and Fisher, divide the consequent by the antecedent, to find the ratio. Sir D. Brewster, Eaton, Thomson, Greenleaf, Perkins, Wanzer, Bonnycastle, and Loomis, divide the antecedent by the consequent to find the ratio. E. g., Eaton says the ratio of 12:3 is 4. Davies says the ratio of 3:12 is 4. Thomson and Greenleaf say it is immaterial which method is employed, as both are correct, but it is more simple in practice to divide the antecedent by the consequent. In *geometrical* proportion, *all*, I believe, without exception, divide the consequent by the antecedent. Thus in the series 1, 3, 9, 27, or 2, 4, 8, 16, the ratio is found by dividing the second by the first. I have five or six other works, (Lacroix among them,) but they are not now at hand; so I will not attempt to say what is their method. It strikes one as being a little remarkable that there should be such a difference among authors. Where *so many* doctors disagree, who shall decide? I would like a little light on the subject.

OBSERVATOR.

AGASSIZ AND OKEN DINING ON POTATOES.

AN interesting fact, not without its moral, is told by Agassiz, of his visit, when a young man to the great German naturalist, Professor Lorenz Oken. The Professor received his guest with warm enthusiasm, but with apparent embarrassment. He showed his visitor the laboratory, and the students at work; also his cabinet; and, lastly, his splendid library of books pertaining to zoölogical science, a collection worth some seven thousand dollars, and well worthy the glow of pride which the owner manifested as he expa-

tiated on its excellence. The dreaded dinner-hour came and now the embarrassment of the great German reached its maximum point. "M. Aggassiz," said he, with evident perturbation, "to gather and keep up this library exacts the utmost husbandry of my pecuniary means. To accomplish this, I allow myself no luxury whatever. Hence my table is restricted to the plainest fare. Thrice a week our dinner boasts of meat; the other days we have only potatoes and salt. I very much regret that your visit has occurred on a potato day." And so the splendid Switzer, and the great German with his students, dined together on potatoes and salt.

BAD ENGLISH PUNCTUATION.

ONE capital fault which pervades and vitiates many peoples' compositions, is ignorance of the principles of punctuation. Sometimes nothing of this sort is attempted, and sometimes dashes are made to do duty indiscriminately. From this follows, as a necessary consequence, a general looseness of construction in the sentences. They are sure to be more or less deformed and ill-conditioned; with participial clauses running loose, or relatives whose references are uncertain. Short sentences and short words are generally best, inasmuch as they are less likely to be misunderstood, and do not require to be read twice. Sometimes the meaning expressed is entirely different from the one intended, or at all events is susceptible of various interpretations. Some sentences are so clumsily put together, that, if printed as written, they would be almost unintelligible; just because the writers have, through laziness or ignorance, accustomed themselves to scribble on without inserting the proper stops as they go. They "stand not upon points." They forget how they began the sentence, and how it ought to end, and thus it comes out imperfectly articulated. — *Leisure Hour*.

ALWAYS use plain and correct language before children.

Resident Editors' Department.

MEETING OF THE STATE ASSOCIATION, AND OF THE AMERICAN INSTITUTE OF INSTRUCTION.

THE time for holding the Annual Meeting of the State Association, as announced in our last issue, has been changed. It is now decided to hold it at Worcester on Monday and Tuesday, the 18th and 19th of August. Prof. Seylee of Amherst, S. W. Mason of Boston, and James K. Lombard of Worcester, have engaged to lecture. A full programme of the meeting will soon be published.

The meeting of the Institute, at Hartford, will commence on the afternoon of the 20th and continue through the two following days. This arrangement gives teachers the opportunity of attending both meetings at the least possible expense. Teachers in the eastern part of the State will make but one trip of it, and it will amount to the same thing to teachers in the western part.

Neither Association has seen fit to tax the private hospitality of citizens. Good accommodations, however, will be furnished at the hotels at half the usual rates. This arrangement, we think, will suit our lady teachers better than the old. At any rate, let them try it this once. It will be easy enough to fall back upon the old plan, when we have the old hospitality extended to us.

We hope both meetings will be large and profitable. Let not Massachusetts teachers give the State meeting the "go-by;" but let all assemble in Worcester, and then proceed in a body to Hartford. This will make both meetings successful.

In laying plans for vacation, arrange for the week commencing on the 18th of August, as follows: leave home on Monday morning; stop in Worcester till Wednesday; then go to Hartford, and remain till Saturday. Please, teachers all, to write this down in your vacation programme.

NOTICE. We commence the latter half of the year with this number. It is a good time to receive new subscribers, and, also payments from those in arrears. "A word to the wise, etc."

"THERE 'S A GOOD TIME COMING!"

YES, and, bless our stars, it is close at hand! That "good time" for rest and enjoyment—the long vacation—is within hailing distance! Vacation, all hail! Welcome, thou friend of teachers! Welcome, thou invigorator of drooping bodies, of aching heads, of unstrung nerves, of sinking spirits! Welcome, thou terminator of a year's toils, and cares, and discouragements, and trials, and troubles, and anxieties, and—so forth. Welcome, thou cordial, thou balm, thou elixir, thou panacea, thou universal tonic! We all rejoice to see thee once more. Wilt thou make thyself at home with us, and stay as long as thou possibly canst?

What charming sights, and what blissful sounds, and fairy dreams imagination conjures up, as we think of the coming vacation! We see millions of boys and girls rushing from school doors and shouting joyously, "No school for six weeks! Hurrah! What fun we 'll have!" We hear their merry voices and sympathize in their delight. God bless their young hearts! We see myriads of teachers wending their gladsome way to old homesteads, to mountain tops and verdant vales, to ocean's sounding shores, to a thousand quiet retreats. How cheerful they are! How quickly the care-worn look has vanished? May good spirits go with them all and fill their cups of joy brimful.

And now for our vacation. What shall we do? Must have a good time. Where shall we go? Let us see. Country, or sea-side? Fresh-water, or salt-water? Trout, or codfish? Mosquitoes, or sculpins? Up hill-sides, or up rigging? Snakes, or sea-serpents? Truly, it is not easy to strike the balance of claims. Ah! We have it! We 'll try both. First we 'll away to the country.

"Nature I 'll court in her sequestered haunts,
By mountain, meadow, streamlet, grove, or cell."

The poets are never more poetical than when singing of life in the country. Cowper goes so far as to sigh,

"Oh for a lodge in some vast wilderness."

We apprehend that lodging in such a place, to say nothing of the board, would not be very conducive to a good time. Perhaps, however, Cowper referred to what Milton calls "A Wilderness of sweets."

"Welcome, ye shades! ye bowery thickets, hail!
Ye lofty pines! ye venerable oaks!
Ye ashes wild, resounding o'er the steep!"

It is indeed a sweet pleasure to rove through wild forests, along river-sides,

or by the babbling brooks, to climb steep mountains, and to inhale the pure air of lofty peaks. We love to lie on the green grass in the shade of some grand old tree, listening to the robin's carols, or watching the friskings of a merry squirrel, or (plague take the mosquitoes!) dozing over some poet's book, until we pass quite into the land of dreams, — who said anything about a gigantic spider climbing to the pinnacle of our nose? or about a regiment of black ants charging at double-quick all along our epidermis? Spiders and ants have a right to enjoy themselves. Moreover who does n't know that when they touch the human frame, they impart to it an elasticity and quickness of movement quite remarkable? We love to drop "line upon line" into a shady pool surrounded by interlacing trees, and tempt the wary trout, by "hook or by crook," to leap into our basket. What if we do tramp half-a-day through brake and fen without the encouragement of a single finny bite! Do n't we get a plenty of bites from all sorts of winged creatures? What care we for an occasional somersault over a treacherous log? or for a miscellaneous tumble into the icy stream? Such things are incidents, not accidents, and give zest to the sport.

We love to — but space and words would fail us, should we attempt to enumerate the delights of a sojourn in the country. Hie we then to the hills and vales, to mountains and plains. Let us enjoy awhile the exquisite pleasures they afford, and then away to

"The sea! the sea! the open sea!
The blue, the fresh, the ever free!"

How wildly the poets exult when they write of the ocean!

— "How happy they,
Who, from the toil and tumult of their lives,
Steal to look down where nought but ocean strives!"

It is all very pleasant to look down on the ocean; but whether it is quite right to "steal" for such a purpose, Byron ought to have considered.

"I love to stand on some high beetling rock,
Or dusky brow of savage promontory,
Watching the waves with all their white crests dancing,
Come, like thick plumed squadrons, to the shore
Gallantly bounding."

No poet has written about the ocean in nobler strains than Byron. What can be finer than these glowing lines?

"Thou glorious mirror, where the Almighty's form
Glasses itself in tempests; in all time,
Calm or convulsed — in breeze, or gale, or storm,
Icing the pole, or in the torrid clime
Dark-heaving; — boundless, endless, and sublime —
The image of eternity."

The man of lofty imagination can never weary of the sea. Whether calmly at rest, or lashed into passion by the stormy winds, the sea always seems to him a vast embodiment of beauty and grandeur.

But besides the nobler pleasures afforded to the imagination by life at the sea-side, there are many delights of an humbler sort. Who does not enjoy the evening stroll upon the hard beach, the lounge upon the cliff, the wild frolic in the surf (where ladies waltz in such dresses!), and the low music of waves that conducts one sweetly to his nightly slumbers! Speaking of slumbers reminds us that one talks of being

"Rocked in the cradle of the deep."

We have had some experience in that cradle, and sometimes we have felt disposed to request the nurse to "jog the cradle" more gently. In fact too violent a movement of said piece of juvenile furniture, we have found very deleterious to health. If we happen to fall into that cradle, we shall fully sympathize with the apostrophe of the poetess.

"Thou glorious sea! more pleasing far
When all thy waters are at rest!"

Yes, the sea-side presents to us wearied teachers a host of wholesome pleasures. They will restore vigor and health to exhausted bodies, and elasticity and cheerfulness to depressed spirits.

But whether we go to the country or to the sea, let us cast off all care, and have a "real good time." Then when our days of rest are all gone, we shall return to our labors cheerful and strong. Fellow-teachers all, we wish you a pleasant vacation!

AMERICAN INSTITUTE OF INSTRUCTION.

THE Thirty-Third Annual Meeting of the American Institute of Instruction will be held in Hartford, Conn., at the State House, on the 20th, 21st, and 22d days of August.

The Board of Directors will meet at the Allyn House on the 20th, at 11 o'clock, A. M.

The Public Exercises will be as follows:

WEDNESDAY, August 20th. At 2 1-2 o'clock, P. M., the meeting will be organized for the transaction of business. The usual addresses of welcome having been made, the President will deliver his Annual Address; after which the following subject will be discussed: *Methods of Teaching Geography*.

At 8 o'clock, P. M., a lecture by Samuel Eliot, President Trinity College, Hartford, Conn.

THURSDAY, August 21st. At 9 o'clock, A. M., a discussion. Subject: *How can the Study of English Grammar, and the English Language, be made more Efficient and Beneficial?*

At 11 o'clock, A. M., a lecture by Joshua Kendall, Esq., Principal of Rhode Island Normal School, Bristol.

At 2 1-2 o'clock, P. M., a lecture by Wm. H. Russell, Esq., Principal of Military Institute, New Haven, Conn.

At 3 1-2 o'clock, P. M., a discussion. Subject: *Ought Military Instruction to be generally introduced into our Schools?*

At 8 o'clock, P. M., a lecture by Hon. Joseph White, Secretary of Massachusetts Board of Education.

FRIDAY, August 22d. At 9 o'clock, A. M., a discussion. Subject: *Methods of Instruction best adapted to develop in Pupils the power of COMMUNICATING Knowledge.*

At 11 o'clock, A. M., a lecture by L. Hall Grandgent, Esq., of the Mayhew School, Boston.

At 2 1-2 o'clock, P. M., a lecture by Hon. D. N. Camp, Superintendent of Public Instruction of Connecticut.

At 8 o'clock, P. M., a lecture by Hon. Wm. D. Swan, of Boston, Mass., to be followed by brief addresses from representatives of several States.

A. P. STONE, *President.*

WM. E. SHELDON, *Recording Secretary.*

ARRANGEMENTS.

By the special request of the Board of Directors, arrangements have been made by the Local Committee at Hartford, whereby persons attending the meeting will be entertained ONLY at the HOTELS, and that at *one half* the usual rates.

HOTELS. The following Hotels will entertain guests at one half their usual rates: Allyn House, 80 Asylum street; American House, 103 State street; City Hotel, 217 Main street; Cooley's Hotel, 629 Main street; Ryder's Hotel, 610 Main street; St. John's Hotel, 445 Main street; Trumbull House, 48 State street.

RAILROADS AND STEAMBOATS. Arrangements have been made with the following Railroad and Steamboat Companies, for the usual reduction of fare, (*i. e.*) full fare paid one way and a free return: Eastern; Boston and Maine; Boston and Lowell; Nashua and Lowell; Wilton and Stony Brook; Essex; Old Colony and Fall River; Worcester and Nashua; Boston and Providence; Hartford, Providence and Fishkill; New Haven, Hartford and Springfield; Connecticut River; New Haven and New York; Hartford and New Haven Steamboat Companies, and the Boston and Worcester Railroad.

RETURN TICKETS. Persons attending the Institute will obtain a free return Ticket from the Secretary of the Institute, which will be good *only* on the Railroad upon which the bearer came to the Institute, and only to the Station from which one "advance fare" was paid.

☞ The Secretary's Certificate of Attendance will NOT be good on the Boston and Worcester Railroad for a free return. Persons going over that road will ask for a Return Check when they purchase their advance ticket.

WM. E. SHELDON, *Recording Secretary.*

West Newton, June 18, 1862.

EXAMINATION QUESTIONS. NORMAL SCHOOL, BOSTON,
1861.

HISTORY.

1. What was the first permanent settlement in North America?
2. When and where was the first settlement in Virginia?
3. What effect upon America had the English revolution of 1688?
4. In what battle was Gen. Wolfe mortally wounded? When was it fought? What other distinguished general was mortally wounded in the same battle?
5. What causes led to the war of the Revolution?
6. Give an account of the attack on Fort Moultrie in 1776.
7. What was the Boston Port Bill?
8. What were the boundaries of the United States at the close of the Revolution?
9. What territory has been since acquired? Name the date of each acquisition.
10. Give some account of the Missouri Compromise.
11. What measures of John Adams's administration excited dissatisfaction?
12. Name three of the victories obtained by Gen. Scott in the Mexican War.
13. Name the first and the last State admitted to the Union since the original thirteen.
14. Name the Presidents who were elected from Virginia. What other States have given Presidents to the Union?
15. What Presidents have been elected by the House of Representatives?
16. How may it happen that a person may be elected President of the United States by the people, without receiving a majority of the votes?
17. What is the object of the Fugitive Slave Law? In whose administration was it enacted?
18. What important events in the history of the United States have occurred since the last Presidential election?
19. Who was the first sole monarch of England?
20. In what wars has England been engaged since Victoria ascended the throne?

ARITHMETIC.

1. Express by words the following quantities:
2000076540; 2304.05006; 1000000000.0000000001.
2. Add the following quantities: Eighty-two thousandths; five and nine ten thousandths; three million and five, and eighty thousand and

thirty-nine millionths. From this sum subtract five hundred thousand and twenty-three and eight thousand seven hundred and nine millionths. Multiply the remainder by four thousandths and divide the product by thirty-five ten thousandths.

3. What is meant by a common multiple? By a common measure? Give an example of each.

4. Find the superficial contents, in yards, of the walls and ceiling of a room which is 15ft. 8in. long, 14ft. 3 in. wide, and 12ft. 2in. high.

5. How many yards of carpeting $\frac{3}{4}$ yd. wide will it take to carpet a room 30ft. long and 18ft. wide?

6. Explain the rule for multiplying one fraction by another.

7. Reduce $\frac{5}{8}$ to a fraction having 12 for a numerator.

8. Find the sum, difference, product, and quotient of $13\frac{1}{2}$ and $4\frac{3}{4}$.

9. $\frac{3}{4}$ of $\frac{4}{5}$ of $\frac{7}{8}$ of a ship is worth $\frac{7}{8}$ of $\frac{5}{6}$ of $\frac{9}{16}$ of the cargo valued at \$36,000. What is the value of the ship?

10. Explain the rule for division of decimals by decimals.

11. How many times will .5 of 1.75 be contained in .25 of $17\frac{1}{2}$?

12. What is the amount of \$8396.58 for 2 yrs. 10 mos. 22 d. at 6 per cent. ? — at 5 per cent. ? — at $8\frac{3}{4}$?

13. What is the present worth of \$475.64 payable in 1 yr. 8 mos. at 7 per cent. ?

14. Bought 50 barrels of flour at \$9 per barrel; but a part of it having been damaged, half of it was sold at a loss of 10 per cent., and the remainder at \$9.50 per bbl. How much was lost by the bargain?

15. What is meant by ratio?

16. The first term of a proportion is $8\frac{1}{2}$, the second 11, and the fourth $6\frac{2}{3}$. What is the third term?

17. If 12 men by working $9\frac{1}{2}$ hours per day, during 5 days of the week, can in 9 weeks dig a trench 539ft. long, $6\frac{1}{4}$ ft. wide, and $2\frac{1}{4}$ ft. deep, how many weeks would it take 9 men, working 10 hours per day during 6 days of the week, to dig a trench 450ft. long, $3\frac{1}{2}$ ft. wide, and $2\frac{3}{4}$ ft. deep.

18. A and B can perform a piece of work in $5\frac{5}{11}$ days, B and C in $6\frac{2}{3}$ days, and A and C in 6 days. In what time would each perform the work alone, and how long would it take them to do it all together?

19. A square field contains 73984 sq. rds. Required, the length of one side.

20. What is the depth of a cubical cellar, the cubical contents of which are equal to those of another cellar whose length, breadth, and height are 144, 36, and 9ft. respectively?

GEOGRAPHY.

1. Into what three departments is Geography divided? Define each.

2. What is Latitude? Upon what is it measured? What is Longitude? Upon what is it measured?

3. What is the latitude of the North Pole? Tropic of Capricorn? Equator? Arctic Circle?
4. On the 21st of June, which has the longer day, New York or London? Why?
5. When it is 11 o'clock P. M. at Boston, what time is it at London?
6. Name the principal gulfs and bays of Europe.
7. What rivers form the Ohio, and what city is at their junction?
8. What States are bounded in part by the Mississippi River?
9. What bay is there between Nova Scotia and New Brunswick, and for what is it remarkable?
10. What are the Trade Winds?
11. What countries border on the Mediterranean Sea, and what are the principal islands that lie in it?
12. What mountains and what rivers would you cross in going in a straight line from Paris to Florence?
13. Through what waters, and near what countries, would a vessel pass in going from Odessa to Bristol, England, thence to St. Louis?
14. Describe the situation of Baltimore, Washington, Richmond, Charleston, and New Orleans, and give the distance of each from New York.
15. What are Llanos? — Pampas? — Selvas?
16. What are tides? How are they caused?
17. What are the northern and southern points of Europe, Asia, Africa, North America, and South America?
18. Name the countries you would pass in following the coast from Portland, Me., to San Francisco, Cal.
19. Sketch a map of Maryland, distinguish its latitude and longitude, and mark the location of Washington and Baltimore.
20. Sketch a map of England, distinguish its latitude and longitude, mark the situation of its principal mountains, the course of the Thames, the Severn, and the Mersey, and the position of London, Liverpool, and Bristol.

GRAMMAR.

1. What are Rules of Grammar, and how are they formed.
2. Analyze the following sentence: "It is not *strange* that even *his* stout heart should now and then have *sunk*, *when* he reflected against *what* odds and *for* what a prize he was in a few hours *to contend*."
3. Parse the italicized words in the above sentence.
4. What is a Noun? What are the properties of nouns, and into what classes are they divided?
5. What is the general rule for forming the plural of nouns, and what are the chief exceptions to the rule?

6. Give the plural of *handful, talisman, who, scarf, quarto, erratum, emphasis, folio, cargo, commander-in-chief*.
7. What is Gender? Name and define the genders.
8. Write the feminine of *earl, wizard, abbot, executor, marquis, hero*.
9. What is Case? Name and define the cases.
10. In what four ways is the nominative independent used?
11. How is the possessive singular formed? Give an example. Name some exceptions to the general rule.
12. How is the possessive plural formed? Give examples.
13. When are words declinable? Give an example of a declinable and of an indeclinable word.
14. Decline in the singular and plural, *which, I, John, lady, man, life*.
15. Define the degrees of comparison.
16. Of the following words, compare such as admit of comparison: *far, some, narrow, French, thin, circular*.
17. What is a Verb? How are verbs divided in respect to their signification and use? How in respect to their form?
18. Give the principal parts of *to write, to dare, to flow, to fly, to flee, to knit, to eat, to set*.
19. Represent and name the principal marks used in punctuation, and tell their use.
20. Correct the errors in the following sentences:
Where was you when I come to the house and set down to rest?
He done the work very easy.
I hav n't got but two pens and I cannot tell certain which is the best.
The enemy whom I saw and told you was there, flew at our approach.
Going towards his house, he come out to meet me with a person whom I expect was a friend.

EXAMINATION QUESTIONS. HIGH SCHOOL, ROXBURY,
1861.

ARITHMETIC.

1. Define the following terms: — Number, Reduction, Measure, Multiple, Factors, and Prime-factors.
2. What are the prime-factors of 7684?
3. Find the greatest common measure of 9360, 437437, and 2018835?
4. Find the least common multiple of 1181, 2741, and 3413.
5. Divide $\frac{1}{2}$ of $\frac{7}{15}$ by $\frac{1}{3}$ of $\frac{2}{4}$ of $\frac{1}{2}$, explain the operations of division and multiplication in the above.

6. Reduce $\frac{2}{11}$ of $\frac{3}{4}$ of $\frac{2}{3}$ of $\frac{1}{5}$ to its simplest form.
7. Reduce $\frac{4}{25}$ acres to the fraction of a square yard.
8. Reduce $\frac{1}{2}$ of a civil year (365 days) to days, etc.
9. Reduce 8s., 25°, 30', 20" to the fraction of a circumference.
10. Add $\frac{4}{3}$, $7\frac{1}{5}$, $4\frac{1}{2}$, and $\frac{1}{3}$ of $2\frac{1}{2}$.
11. From $3\frac{1}{2}$ take $5\frac{1}{5}$.
12. How many times will a wheel that is $9\frac{1}{2}$ feet in circumference turn round in running $17\frac{3}{4}$ miles?
13. How much cloth that is $\frac{3}{8}$ of a yd. wide, will it take to line a cloak containing $8\frac{1}{4}$ yds., which is $\frac{1}{2}$ of a yd. wide?
14. A piece of land is 63.5 rods long and 27.75 rods wide; what will it cost to wall it at $87\frac{1}{2}$ cts. per rod?
15. B sold an ox which weighed 17 cwt. 3 qr. 8 lbs., and two cows that weighed 5 cwt. 3 qr. 18 lbs each; three swine that weighed 3 cwt. 2 qr. 12 lbs., 4 cwt. 1 qr. 18 lbs., and 5 cwt. 3 qr. 6 lbs., respectively. How much more beef than pork did he sell?
16. What is the amount of 48.50 for 1 year, 8 months, 17 days, at $4\frac{1}{2}$ per cent. simple interest?

GRAMMAR.

1. Why is the r doubled in conferred?
2. Why is the l not doubled in toiling?
3. What is a sentence?
4. What is a proper noun?
5. What is an abstract noun?
6. Why are abstract nouns so called?
7. What is the regular mode of forming the plural?
8. How do nouns ending in y form the plural?
9. How do compound nouns form the plural?
10. Give exceptions.
11. How is the possessive case plural formed, when the nominative plural does not end in s?
12. What is parsing?
13. When do nouns become adjectives?
14. What is a passive verb, and how is one formed?
15. Parse the words in italics in the following lines:

"With equal minds *what happens* let us bear,
Nor joy nor grieve too much for things beyond our care."
16. Analyze the preceding sentence.

HISTORY.

1. Define the following words: Tariff, Embargo, Nullification, Rebellion, Revolution.
2. To whom is the world indebted for the discovery of America?
3. Who first sailed to India round the Cape of Good Hope?
4. When, and with what force did Cortez invade Mexico?
5. By what right did Europeans take possession of the parts of America which they visited?
6. How were the original inhabitants treated?
7. When did the Crown of England grant the Charter under which the first effectual English settlements were made in North America?
8. What two companies were constituted?
9. What territory was assigned to each?
10. What Act was passed by Parliament in 1767?
11. What was done to render the act effectual?
12. When, and where did the Revolutionary War commence?
13. What change was made in the theatre of the war in 1779?
14. What State was the principal theatre of the war in 1780?
15. What difficulties arose when the American army was about to be disbanded?
16. How had the army been paid, and what was its condition?
17. What was the great measure of the first term of Mr. Jefferson's administration.
18. What did the French Berlin Decree declare?
19. In what wars did General Jackson acquire a high military reputation?

GEOGRAPHY.

1. Name the circles which bound the zones.
2. On what does the temperature of a place depend?
3. Name and locate the capitals of the Middle States.
4. What are the principal productions of the Southern States?
5. How do the waters of Lake Champlain reach the Ocean?
6. Sketch a map showing the relative situation of the zones, equator, tropics, polar circles, and poles, and mark the latitude of each.
7. What is a republic? What is a degree?
8. Name and locate the first five cities of the United States in the order of their population: the first four in Europe.
9. Name the principal exports of Russia.
10. Through what waters would a vessel pass in sailing from Chicago to St. Petersburg?
11. What is the latitude of Boston? The longitude?

12. Bound Kentucky.
 13. What causes day and night, the tides, the winds, the seasons?
 14. Sketch a map of Roxbury.
 15. What isthmus unites Africa and Asia?
 16. Sketch maps of the following rivers, designating their latitude and longitude: Mississippi and its principal branches, and the Danube.
-

PLYMOUTH COUNTY TEACHERS' ASSOCIATION.

THE Twenty-fifth Semi-Annual Meeting of the Plymouth County Teachers' Association was held in Duxbury, June 13th and 14th.

The meeting was called to order by the President, A. G. Boyden of Bridgewater, and prayer was offered by Rev. Mr. Edson of Duxbury. Rev. Mr. Tisdale welcomed the Association in a short address, which was responded to by the President.

Dr. Haven of Boston, delivered a lecture on "The Duties and Position of American Teachers;" Dr. Dio Lewis on "The Eye and the Ear;" and W. T. Adams on "The Relations of the Teacher to his Pupils."

Remarks on Grammar, including valuable suggestions to teachers, were made by Mr. J. H. Schneider of Bridgewater, who was followed by others on the same subject.

Mr. Cornish of Plymouth, spoke on the study of Geography, and Mr. Noyes of Abington, submitted his method of teaching the same.

Mr. A. P. Stone of Plymouth, spoke on History, condemning the use of printed questions, and urging more complete adaptation of text-books to pupils, and the fixing of few judiciously selected dates, from which the time of events related thereto can be inferred.

On the question of the authority of the teacher beyond the hours of the regular sessions of the school, Hon. Joseph White of Boston, maintained that the powers of the teacher must include such as good sense determines to be necessary to accomplish the object of the school, and heartily endorsed the decision of the Supreme Court of Vermont sustaining a teacher in punishing a pupil, who, while standing on his father's grounds, insulted the teacher and his pupils.

Remarks were made by Mr. Cornish on subjects suggested by members to a committee appointed to collect questions on which remarks were desired.

Appropriate resolutions were presented and adopted, referring to the death of Moses Brown of Pembroke, an active, well-known member of the Association.

After receiving and accepting the reports of several committees, the Association adjourned by singing Old Hundred.

C. F. DEXTER, *Secretary*.

California. The most prominent College of this State is located at Oakland, and is steadily progressing. The College classes are pursuing studies corresponding with those of the best Eastern Colleges. Rev. S. H. Willey has recently been chosen Vice-President.

EDUCATIONAL INTELLIGENCE.

Connecticut. The report of the Superintendent of Common Schools, David N. Camp, Esq., is an interesting and useful document. It treats of the wants of the schools, methods of teaching, classification, etc. In answer to the question, "What in your opinion is needed to make our Common Schools more efficient?"—from sixty-three towns comes the reply, "better teachers," and from sixty, "greater parental interest." We are inclined to think these two combined would improve the schools of any State.

It appears from the report that the number of children between *four* and *sixteen* in the State is 109,042; number of pupils registered in winter 73,949; number in summer 67,982; number of male teachers in winter 970, in summer 171; of female teachers in winter 1,029, in summer 1,810; average wages of male teachers \$32.02, of female teachers \$16.14; school fund \$2,050,460.49.

Secessia. The same week in which General Buel occupied Nashville, the Common Schools of the city were re-opened, having been closed for several months.

A few years ago, the Louisiana State Superintendent of Schools made an urgent recommendation in his report, that at least two out of the three school district directors should be required to be able to read and write, and he told of one parish where the twelve directors made their marks to a teacher's certificate!

Italy. A census of the kingdoms of Italy was taken on December 31, 1861. Some of its results have already been made public. The proportion of persons able to read is nearly as follows: in Lombardy between 30 and 40 per cent.; in Piedmont, from 20 to 30 per cent.; in Tuscany, from 10 to 20 per cent.; in the the region near Rome, not one per cent. Settembrini, the Inspector of Public Instruction, reports that in the province of Naples only one child in a thousand gets any instruction in school.

ERRATA.

OUR printer is usually very correct. We often look over page after page "of proof" without finding a single error. But somehow his types failed to do justice to the article "HINTS," and as it was printed before being seen by the editorial "proof-reader," there was no opportunity to correct the mistakes. We beg pardon of the writer of the article, and if he will only write again, he shall be introduced to the public in better form.

On page 252, first line, please read IIS. instead of IS.; second and fifth lines, *sestertius* instead of *sestertices*; fourth line, *half* instead of *halve*; and sixth line, the quotation marks preceding *The* should follow *half*, the passage quoted ending with that word.

WE have delayed this number of the *Teacher* to announce the arrangements for the State Meeting. The next number will be issued earlier than usual that it may reach our readers before the commencement of vacation.

THE INDEPENDENT.

WE are glad to have the privilege of placing this ably conducted journal upon our exchange list. In the number before us we find in the *Editors' Book Table* a list of the various educational journals, our own among the number, in regard to which the editor writes as follows.

"We have not space to examine separately the state educational monthlies whose titles we give. They constitute a distinct class of periodicals, and have attracted far less attention and patronage than their merits would justify. They have been established entirely for the benefit of the teachers' profession and the improvement of schools and education. They are mostly the organs of the teachers' associations of their respective states, and in some cases — as they should be always — the official organs of the state school superintendents. In this latter capacity they can be of great service in publishing the current school laws, decisions under them, and other information relating to the school departments of the state governments. The matter of these journals is almost exclusively contributed by teachers; and consists of theoretical or didactic essays, seldom of much value; educational addresses, often very well written; with sometimes detailed expositions of successful methods of discipline or instruction, which are very valuable indeed, and should be multiplied as much as possible.

"These monthlies, like the other educational literature of the day, very distinctly exhibit realist tendencies. Articles on 'object-lessons' or on practices similar in principal, such as modes of teaching geography, arithmetic, etc., by means of visible illustrations and demonstrations, are perhaps the most noticeable feature of their contents. In current information as to the progress of schools and education in their respective states, they are not by any means as full as is desirable. But such information is difficult to procure."

THE PENNSYLVANIA SCHOOL JOURNAL

COMPLETED with its June number the tenth volume. Its Editor and publisher, Tho. H. Burrows, furnishes a very interesting article at the completion of the decade. We cannot resist the temptation to copy from it a few sentences.

"This is probably the only educational periodical in the Union which has continued, under the charge of the same editor, without missing a number or taxing its friends for contribution, for an unbroken period of ten years."

After an interesting retrospect, the plan and the matter of the journal are made known, and followed by a statement of the means. The average yearly compensation to the editor for labor, postage, packing, use of office, etc., has been \$413; exclusive of the first six months, when the *Journal* was published at a loss of about \$150.

"This statement of the condition of the Journal is made, not in the spirit of grumbling, or even to elicit help. The former, in the Editor's life experience, has

never been found to do any good, and the latter should not be invoked except in extreme circumstances, — which, thank God! neither the Journal nor its Editor has ever yet reached. But at length the time seemed to have arrived, for setting this whole matter before the educational public of the State, and of becoming relieved of the suspicion of fattening off the cause of common school education. Added to this, is the wish to prevent any more losses or mistakes being made, by adventurers in the same field. These will now see more clearly their chance of success, when they know how little this undertaking has achieved, even when backed up by the patronage of the State, and sustained, in *extremis*, by private means.

"The truth is, that 'School Journals' can never be made profitable to their proprietors. The Teacher's profession is so fluctuating, that a moderate support one year cannot be assumed as the basis of much increase the next; for not more than one-third of the old subscriptions are ever renewed. — Then again, the subscription price is so small as to preclude the hope of large profit, except on a list greater than the support of any one State can afford; — and to swell the list by travelling agents is out of the question, owing to the expense.

"On its present basis, however, this Journal can be kept in existence, and will, so long as it is felt to be doing good, in its own, plain, practical manner."

BOOK NOTICES.

ELEMENTS OF ALGEBRA: containing Higher Arithmetic. Designed for Schools, Academies, and Colleges. By JOSEPH H. PALMER, A. M. New York: Charles Scribner, 124 Grand St.

The open page and neat typographical appearance of this book commend it at once to favor; nor will that favor be lost by an examination of its contents. The plan and methods of the work are excellent. Mr. Palmer has been the teacher of mathematics in the New York Free Academy twelve years, and gives us here the results of his experience. Teachers and committees will find the book worthy their attention.

ANALYSIS OF THE ENGLISH SENTENCE: designed for advanced classes in English Grammar. By A. S. WELCH, A. M., Principal of Michigan State Normal School. New York: A. S. Barnes & Burr, 51 & 53 John Street.

We are glad to welcome a new and revised edition of this valuable work. Such improvements as have been suggested by daily use in the schoolroom, have been made, and it now can hardly fail to meet the wants of teachers. It presents a good form of analysis with clear and concise explanations, and abundant examples.

INFANTRY TACTICS FOR SCHOOLS. Explained and Illustrated for the use of Teachers and Scholars. By the Author of School Amusements. New York: A. S. Barnes & Burr.

We are glad we have had some experience in a "Home Guard." Otherwise, we could not have appreciated this book. We know now it is all right. We believe a little military drill in connection with gymnastic exercises in schools is beneficial. Teachers will find much in this little book they can put in practice, and young lads who desire to form companies will find it just the thing. For sale by Geo. L. Dix & Co., Washington Street, Boston.

PRIMARY ARITHMETIC. By CHARLES DAVIES, LL. D. New York: A. S. Barnes & Burr.

This excellent little work is based upon right principles. We look upon the author's definition of *counting*, — "Counting is expressing consecutive numbers in words," — as rather tough for little beginners. However, they will find nothing else to trouble them, and if they study the book faithfully they cannot help laying a good foundation for their arithmetical knowledge.

GUYOT'S SLATED MAP DRAWING CARDS:

A good thing. These Cards have a silicious surface from which slate-pencil marks can be erased with the same ease as from a slate. The set consists of eight, — the Hemispheres, the Grand Divisions, and the United States. We hope they are cheap enough to admit of extensive use, as there can be no question of their utility.

The same Cards are also published in another form for lead-pencil or ink drawing. They are the best thing of the kind we have seen. For sale by Lee & Shepherd, 153 Washington Street, Boston.

RULES AND REGULATIONS FOR THE EXAMINATION OF CANDIDATES FOR TEACHERS' CERTIFICATES OR DIPLOMAS, AND CATALOGUE DES DIFFERENTES COLLECTIONS DE L'ECOLE NORMALE JACQUES CARTIER. MINERALOGIE.

The above valuable documents come to us from Lower Canada, for which our thanks are due.

THE AMERICAN JOURNAL OF EDUCATION. New Series, No. 2. Edited by HENRY BARNARD, LL. D.

The June number of this excellent quarterly has been received. To those acquainted with it, it will be enough to say that it contains the usual amount of valuable reading. A fine portrait of Dr. S. G. Howe precedes the title page. Its articles are: *The State and Education*; *Conversation on Objects*; *Specimen Lesson on Objects*; *M. Guizot's Ministry of Public Instruction in France*; *Memoir of Samuel Gridley Howe*; *The Study of German Language in German Schools*; *Physical Education*; *Thoughts on Education* (by John Locke); *Thoughts on Education* (by Herbert Spencer); *Military Exercises in Public Schools*; *New Gymnastics*; *School Architecture*.

HARVARD UNIVERSITY.

LAWRENCE SCIENTIFIC SCHOOL.

The next Term in the Chemical Department begins August 28. The Regular Course includes Recitations in General Chemistry, Qualitative and Quantitative Analysis, Physics, and Technical Chemistry, and Instruction in the Laboratory in Analysis, Agricultural and Manufacturing Chemistry, Metallurgy and Pharmacy. Students may also attend Recitations in Anatomy and Physiology, Mineralogy, Physical Geography, and Political Economy, and courses of Lectures on *Geology and Zoology*, Prof. Agassiz; *Philosophy*, Prof. Bowen; *Chemistry*, Prof. Cooke; *Botany*, Prof. Gray; *Technology*, Prof. Horsford; *Literature*, Prof. Lowell; *Physics*, Prof. Lovering; *Mathematics*, Prof. Peirce; *History*, Prof. Torrey; *Anatomy*, Prof. Wyman. This Department receives general students, who seek a thorough scientific education, and also special students in Chemistry applied to Medicine, Metallurgy or Manufactures. For further information, address C. W. ELIOT, Prof. of Chemistry, CAMBRIDGE, MASS.

J. A. LOWELL,

June, '62. — 3m.

Chairman of the President and Fellows of Harvard College.

JUST PUBLISHED.

EATON'S Common School Arithmetic.

A FULL COURSE OF WRITTEN ARITHMETIC FOR COMMON AND GRAMMAR SCHOOLS, combining ANALYSIS and SYNTHESIS, and adapted to the best mode of instruction. By JAMES S. EATON, Instructor in Phillips Academy, Andover, Mass., and author of a Series of Arithmetics.

12mo. 300 pp. Half morocco. Price 50 cts.

The appearance of EATON'S NEW TREATISE ON WRITTEN ARITHMETIC, about four years since, was the cause of rousing the attention of many teachers to a more thorough, clear, full and satisfactory treatment of the principles of arithmetic as they are presented in the class-room. The tedious, wordy, inaccurate books in arithmetic, which, absolutely for want of better, had long been in use in our New England Schools, with their crooked and knotty methods and explanations, were creating a distaste for this important branch to study. EATON'S TREATISE was found to be a superior book, and specially adapted for use in High Schools and Academies, and in Grammar and Common Schools of the first class. In these it has achieved a permanent circulation, which only a book of high merit could reach. For the lower class of Grammar Schools, and many Common Schools, which for numerous reasons cannot maintain a high rank, where a less extended, but no less thorough and complete course of Written Arithmetic is needed, the author now presents THE COMMON SCHOOL ARITHMETIC. It is in no way a revision of the "TREATISE," but entirely distinct from that work. The definitions and rules are substantially the same, while some of the explanations are more simplified. THE EXAMPLES IT CONTAINS ARE WHOLLY DIFFERENT. Its general methods and character are of course similar.

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July, '82. — 11.

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STATE OF NEW JERSEY, DEPARTMENT OF PUBLIC INSTRUCTION, Newark, Feb. 17, 1862.

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Yours respectfully,

F. W. RECORD, State Sup't of Pub. Schools of N. J.

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From the author of Greenleaf's Mathematical Series.

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Yours respectfully,

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Apr. '62.

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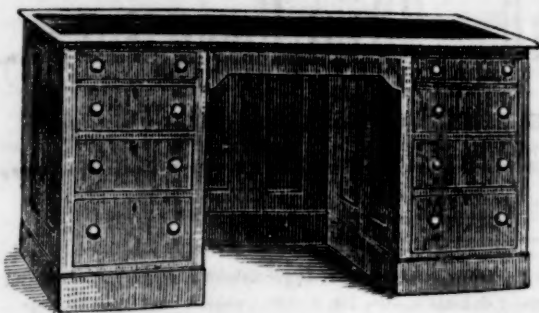
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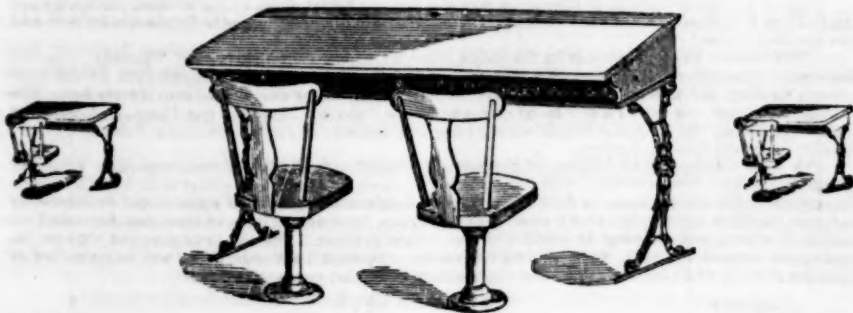
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